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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/800,904	03/08/2001	Byung-hee Kim	SEC.467D	8021

7590 11/20/2003

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EXAMINER	
ESTRADA, MICHELLE	
ART UNIT	**PAPER NUMBER**
2823	

DATE MAILED: 11/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/800,904	KIM ET AL.	
	Examiner	Art Unit	
	Michelle Estrada	2823	

-- The MAILING DATE of this communication appears on th cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 July 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Larson et al. (5206,788) and Desu et al. (5,817,170).

Larson et al. disclose forming a lower electrode (20); forming a ferroelectric layer (30a) on the lower electrode; forming a ferroelectric layer (30b) on the ferroelectric layer (30a); forming a ferroelectric layer (30c) on the ferroelectric layer (30b); annealing the resulting structure (Col. 4, lines 61-68); and forming an upper electrode (40) on the ferroelectric layer (30c); wherein forming a ferroelectric layer comprises forming a PZT ferroelectric layer (Col.4, line 35).

Larson et al. do not disclose forming a lower seed layer and an upper seed layer; wherein the forming the upper and lower seed layers includes using a material having a crystallization temperature lower than that of a material for forming the ferroelectric layer; wherein the forming the upper and lower seed layers includes using a ferroelectric material having a lattice constant similar to that of a material for forming the ferroelectric layer; wherein the forming the upper and lower seed layers includes using PZT having at least one of a higher Pb content and a higher Ti composition ratio than a PZT to be

used to form the ferroelectric layer; wherein the forming the lower electrode and the upper electrode includes using a Pt-group metal layer.

Desu et al. disclose forming a seed layer (20); forming a ferroelectric layer (30) of PZT; forming an upper seed layer (40) and annealing the resultant structure including completing a perovskite crystal structure on the ferroelectric layer (Col. 2, lines 55-65 and Col. 4, lines 50-58); wherein the forming the upper and lower seed layers includes using a material having a crystallization temperature lower than that of a material for forming the ferroelectric layer; wherein the forming the upper and lower seed layers includes using a ferroelectric material having a lattice constant similar to that of a material for forming the ferroelectric layer; wherein the forming the upper and lower seed layers includes using PZT having at least one of a higher Pb content and a higher Ti composition ratio than a PZT to be used to form the ferroelectric layer; wherein the forming the lower electrode and the upper electrode includes using a Pt-group metal layer. The capping layer (40) of Desu et al. is inherently a seed layer because PbO is used as seed layer material as described by Kim (6.333,066).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Larson et al. and Desu et al. to enable formation of the perovskite crystal structure.

Claims 19-20 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Larson et al. and Desu et al. as applied to claims 13-18 above, and further in view of Hsu et al. (6,048,738).

The combination does not disclose further comprising, prior to forming the lower electrode, forming a switching element to be electrically connected to the lower electrode; and further comprising before forming the lower electrode providing a semiconductor substrate; and forming a gate insulating layer on the semiconductor substrate, and after the forming the upper electrode forming source and drain regions in a portion of the semiconductor substrate adjacent to a periphery of the gate insulating layer.

Hsu et al. disclose providing a semiconductor substrate; and forming a gate insulating layer (72) on the semiconductor substrate, forming a polysilicon layer (74); forming a lower electrode (76); forming a ferroelectric layer (78); forming an upper electrode (80) and after the forming the upper electrode forming source and drain regions in a portion of the semiconductor substrate adjacent to a periphery of the gate insulating layer (Col. 5, lines 24-32); and forming a switching element to be electrically connected to the lower electrode (See fig. 9).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Larson et al., Desu et al. and Hsu et al. to enable formation of the ferroelectric structure and further provides the final elements to the structure.

Response to Arguments

Applicant's arguments filed 7/23/03 have been fully considered but they are not persuasive. Applicant argues that Desu does not disclose forming a lower and upper

seed layer using a material having a crystallization temperature lower than that of a material for forming the ferroelectric layer. However, the materials used by Desu have a crystallization temperature lower than that of a material for forming the ferroelectric layer as described in Col. 4, line 59-Col. 5, line 7.

Applicant argues that Desu does not disclose forming a lower and upper seed layers using a ferroelectric material having a lattice constant similar to that of a material forming the ferroelectric layer. However, Applicant has not established that the range recited through use of "similar" excludes the difference in lattice constants of the combination.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is (703) 308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

George Fourson
Primary Examiner
Art Unit 2823

MEstrada
November 13, 2003